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ECONOMIC COMMISSION FOR WESTERN ASIA
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Meeting on Selected Branches of the
Food Processing Industry in the Middle East

Beirut, 3-8 March 1975

FOOD CANNING INDUSTRY IN IRAQ[1/]

by

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and

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* President of State Organization of Food Industries, Baghdad

**Head of Technical Department, State Organization for Food Industries, Baghdad

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Selected Branches of the Food Industry
in Selected Countries of the Middle East

Beirut, Lebanon, 2 - 8 March 1975

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1. INTRODUCTION

Food Canning Industry in Iraq is a relatively new industry. In 1963 a canning plant started operating in the city of Kerbala situated 100 kilometers south of Baghdad. This plant passed through many stages of developments and became the major producer of canned food in Iraq. It is now operated by the state canning company (one of the State Organization of Food Industry companies). It has a paid up capital of I.Dr. 1,257,344 and employs 1260 persons. The sales volume of the company exceeded five million Iraqi Dinars in Fiscal year 1973-1974 The company produces Tomato paste, Date syrup, Jams and canned vegetables.

This report will entirely be devoted to the activities of the public sector of the canning industry in Iraq since all other private companies are small in size and activities.

2. Raw Materials

Canning Industry in Iraq depends for most of its requirements of raw materials on the surplus of vegetables and fruits which are then processed or preserved to be made available for consumption during the off-season periods.

Table No. 1. shows the quantities and values of raw and packing materials used by the State Canning Company during the fiscal year 1972-1973. The table also shows that raw materials forms 67 percent of the total comodity requirements, 58 percent of which is imported mainly as concentrated tomato paste.

Local Supply of raw materials

Local production of raw materials during the years 1960-1969 including vegetables, fruits, dates and tomato will be discussed.

a) Vegetables (winter crop)

Vegetables that are grown during winter season include in the order of importance: Green broad beans, Green Onion, Lettuce, Turnip, Radish, Swiss Chard Carrot, Spinach, Cauliflower and Green French or kidney beans.

Table 2 shows local production and consumption of these vegetables during the years 1960-1969. This table reveals that about 10% of the local demand is imported. During 1968 and 1969 small surplus became available for export.

Table 3 shows the relative importance of different vegetables as far as quantity produced is concerned. It appears that green broad beans and green onion form 50% of total production of vegetables grown during winter 1970-1971.

b) Vegetables (summer crop)

These include Okra, Eggplant, Cucumber, Gherkins, water melon, green melon, green peper, pumpkin and green beans.

Table 4 shows local production and consumption of these vegetables during the years 1960 to 1969. This table shows that acreage has been doubled during 10 years period. Imports were continuously decreasing whereby surpluses became available for export.

Table No. 5 gives an idea on total production of winter and summer crop vegetables with their relative importance. It shows that 15-20% of total vegetable production is produced as winter crop of which summer crop vegetables form 80-85 percent of total production of vegetables.

c) Tomato

Table 6 shows local consumption of fresh tomato during the period 1964-1973. It is clearly seen that imports of fresh tomato are diminshing and greater quantities are made available for tomato paste production.

Local production of tomato is characterized by relatively low yeild per unit of area, being in the range of 8 tons per hectare as compared to 100-150 tons per hectare in other well developed countries.
Local production of tomato paste do not meet the demand, hence the balance is imported. Table 6 shows quantities of tomato paste imported and its equivalent of fresh tomato to obtain the total local demand of fresh tomato calculation.

is made on the basis of every ton of paste is produced from 6 tons of fresh tomatoes). The table shows that the country imports about 33% of its requirement of tomato (as fresh tomato). Tomato paste forms 20% of the total fresh tomato consumed.

d) Dates

Table 8 shows local production of dates in Iraq and the quantities exported. Less than 5% of this total available quantity of dates was used for date syrup production.

e) Fruits

Table 9 gives an idea about the type and quantities of fruits grown in Iraq, while table 10 shows the quantities of fruits exported and imported.

3. Production Capacities

A. Existing Plants:

The canning plants now operating in Iraq are as follows:

a. Kerbala Canning Plant

This plant has four production lines to produce tomato paste, date syrup, jams and canned vegetables.

b. Numaniya Tomato paste plant

c. Baquba Tomato paste plant

The above two plants situated in the cities of Numaniya (150 km south east of Baghdad) and Baguba (100 km. north east of Baghdad) produces tomato paste only at a capacity of 25 tons of paste per day for each plant.

Additional lines are being added to these two plants as will be explained later in this report.

The above three plants are operated by the State Canning Company which has its headquarters in Karbala. Table 11 shows the rate of progress which the company achieved during the last 6 years in terms of Sales quantity and value which was multiplied 20 times during this period. Table(11 a)shows the progress in terms of fixed capital investment which shows an increase of 866% over the last 6 years.(chart No. 1 shows this progress schematically).

Table No. 12 gives the quantities of products sold during 1972-1973 and 1973-1974 while table 13 gives the planned production of the company.

B. Plants Under Construction

a. Dohok Canning Plant

Planned to commence production during 1975 to produce the following:

1000 Ton/year Grape Juice
200 Ton/year Apple Juice
1000 Ton/year Fruit compote
300 Tons/year Jams
1000 Tons/year Dried Fruits
75 Tons/day Tomato paste

b. Hasir Canning Plant

Planned to start production during 1976 to produce the following:

1500 Ton/year Grape Juice
850000 liter/year Wine
1500 Tons/year Fruit compote
1000 Tons/year Jams

c. Expansion of Baquoba Canning Plant

The existing tomato paste line at Baquoba has a capacity of about 25 tons of paste per day. The following additional lines are being installed at the same location.

- Second Tomato paste line similler to the existing line.
- Canned Peeled Tomato line with a capacity of 1.6-2 tons/hr.
- Onion Dehydration Plant with a capacity of 6-7 tons of dry onion per day.

All the above new lines are expected to start operation during 1975.

d. Numaniya Canning Factory

A second tomato paste line is now being constructed in Numaniya with a capacity of 25 tons of paste per day .

Tomato juice line with capacity of 1.5 - 3 tons of Fresh tomato per hr. and Vinegerplant from date with a capacity of 5000 tons per year are also expected to be completed during 1975.

e. Balad Canning Plant

Tomato paste plant with a capacity of 50 tons per day will become operational during 1976.

Canning Plants Suggested for Execution:

The following plants are being suggested for execution as soon as approval of their feasibility studies are obtained.

- Baby food at Baled with capacity of 2500 tons/ year
- Tomato paste lines with total capacity 100 tons of paste per day.
- Onion Dehydration plant, 6-7 tons of dry onion per day.
- Grape Juice plant, with a capacity of 1500 tons per year.
- Canned vegetables in Kerbala with a capacity of 1-1.5 tons per day.
- Frozen vegetables at Baled with 2 tons per hr. capacity.

4. Consumption Pattern and Forecasts:

Table No. 14 shows the consumption pattern of the four main canned products during the years 1960-1969 for which data are available. These products are jams, date syrup, canned vegetables and fruits and tomato paste.

Except for tomato paste where consumption figures shows steady and almost regular increase, consumption of other canned products showed sharp fluctuations due to irregular supply of raw materials or irregular demand on these products. Therefore no sound basis could be obtained for forcasting satisfactorily future consumption of canned products except for tomato paste for which consumption forecasting until 1985 is shown on Table No. 15. Calculation of these forecast figures was obtained by extrapolating a straight line through data of 3 year averages to eliminate the effect of fluctuation on consumption patterns. Based on these forecasts Iraq is expected to consume about 20,000 tons of tomato paste during 1975 and about 25,000 tons during 1985. Table No. 16 shows the per capita consumption of tomato paste in Iraq during the years 1960-1969.

5. Problems Facing the Canning Industry in Iraq:

A. Availability of raw material:

Data of local production of fruits and vegetables in Iraq showed that the surplus available for canning industry is rather limited. Short supply of agricultural raw materials was the major obstacle hindering the growth of canning industry.

Development of agricultural production of raw materials for the canning industry is believed to be one of the most important fields where United Nations technical assistance could be utilized.

Tin plate plays an important part in the canning industry as packing material.

This comodity is entirely imported from foreign source. Raising prices of the tin plate and its scarcity in the market is another problem facing the canning industry in Iraq.

Use of substitutes like glass and plastics which could be made available locally are being encouraged.

b) Policies of agricultural raw materials:

The canning industry in Iraq is characterized by the domination of the public sector who operates about 90-95% of its activities. The agricultural production, on the other part, is operated mainly by the private sector and cooperatives in which the government have limited influence. Due to this situation, no regular supply of agricultural raw material could be secured for the canning industry.

Stimulation of agricultural private sector to supply part of the requirement of the canning industry was made through contracts made between the two parties in which the industry supplies seeds, loans, advice.. etc. to the farmer. This policy was rather successful in stumulating the production of two agricultural products needed by the canning industry, namely Tomato for paste production and water-melon for jam production.

c) Training of Personnel:

Training of personnel for the canning industry was very limited and on-the-job-training schemes was the only method used to bring up trained staff for this industry. The importance of training was then realized and plans was put

to build two training centres. The first one will be located in Baquba and devoted to the training of staff for the food industry in general while the second training centre planned to be built in Kerbala.will be oriented entirely to the education, research and training of personnel for the canning industry.

These two centres will bring up trained personnel for the canning plant already under construction or planned for execution in the future.

d) Exportability of Products:

Due to reason contributed to the high price of major raw and packing materials of canned products, it was difficult for these products to compete in foreign markets. Very limited quantities of canned food was exported to the Arabian Gulf countries where freight cost in an advantage to Iraqi exported commodities.

The table below indicates the value of exported canned products during fiscal years 1972-1973 and 1973-1974 and the countries to whome these products were exported.

Product	Value of canned product exported (Iraqi Dinars) 1972-1973	1973-1974	Countries to whome products were exported. 1972-1973	1973-74
Date Syrup	5952	66284	Syria	Syria, Lebanon.
Jams	5027	2206	Bahrain	Jorden, Kuwait, Quatar, Pakistan Abu Dubi, Tanzania, Cyprus, afganistan

Canned Vegetables	15947	8223	Kuwait, Bahrain	Cyprus, Afganistan
Total	26926	76763		

c) Technical Problems:

It is well known that Iraq is the major producer of dates in the world. The technology and know-how for processing of date into date syrup and other products is very limited in the world. Hence, it is very important that Iraq should develop his own technology for these products.

Among the dificulties encountered in the processing of date syrup was the following:

- The development of an economical method for the removal of pectin from the syrup. It is known that pectin could be removed or destroyed by enzyme or heat application.

  The first method is rather expensive while the latter could produce deterioration of the colour of the syrup by caramilization.

- The development of an efficient method of sterilizing date syrup in cans and improving its keepability without subjecting it to undue severe conditions.

- The extraction of juice from dates and the filteration and clarification of the juice display certain unique characteristics which require further study and development.

6. Conclusions

Data of local production of fruits and vegetables in Iraq showed that surplus available for canning industry is limited. Short supply of raw material was the major obstacle hindering the growth of canning industry.

It is expected that completion of the new canning projects will stimulate the growth of agricultural production and hence more raw material will be made available to the canning industry.

Development of agricultural raw materials production for canning industry is believed to be one of the most important fields where United Nations technical assistance could be utilized.

Table No. (1)

Comodities Used by State Canning Co. in Kerbala in Fiscal 72-73

Material	Unit	Quantity			Value ID			%
		Local	Imported	Total	Local	Imported	Total	
A) Raw Materials								
1. Fruits	Ton	706	-	706	11000	-	11000	
2. Vegetables	Ton	573	-	573	15000	-	15000	
3. Fresh Tomato	Ton	8218	-	8218	205000	-	205000	
4. Dates	Ton	2483	-	2483	25000	-	25000	
5. Conc. Tomato Paste	Ton	-	3860	3860	-	359000	359000	
Total					256000	359000	615000	67%
B) Packing Materials								
1. Tins & Cans	Thousand Units	5231	-	5231	155000	-	155000	
2. Tin Plate	Ton	-	375	375	-	47000	47000	
Total					155000	47000	202000	22%
C) Other Com.					106000		106000	11%
Ratio of Local Com. to Imported					56 %	44%		100%

Table No. 2

Local Production and Consumption of Vegetables (winter crop)

	Unit	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Area Planted	Donum	108321	101814	83309	102650	109121	121945	131051	144840	146362	157771
Production	Ton	117758	148113	173981	197100	151990	251772	262659	287394	290124	261921
Imports	Ton	15416	14575	20064	18437	20619	24375	26331	27104	32007	25203
Exports	Ton	-	-	-	-	-	-	-	-	1553	308
Local Consumption	Ton	133174	152688	194045	215537	172609	276147	288990	314499	320578	306816

Table No. 3
Production of Important Winter crop vegetables
during 1970 - 1971

Type of Vegetable	Area Planted Donum	Yeild Kgm/Donum	Production Ton	%
Green broad beans	63884	1582	101104	30%
Green Onion	28026	2794	67188	20%
Lettuce	14312	2817	40314	12%
Turnip	12318	2408	29667	9%
Radish	10532	2701	28449	8%
Cabbage	4449	3484	15501	5%
Swiss chard	8728	1728	15076	4.5%
Beet	4234	3306	13996	4%
Carrot	3442	3084	10615	3%
Spinach	5729	5729	8484	2.5%
Cauliflower	2463	2706	6661	2%
			337055	100%

Source: "Study of Production cost and yield of winter & summer crop vegetables in Iraq for season 1970 - 1971"
Prepared by studies and Research Div.
Ministry of Agriculture and Agrarian Reform, Oct. 1973

Table No. 4

Local Production and Consumption of Vegetables (Summer crop) except Tomato

	Unit	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Area Planted	Donum	288924	263819	284951	310021	381856	410592	434687	493743	468475	489277
Production	Ton	472416	505215	637622	675525	884411	946843	989875	1367781	1074022	1160811
Import	Ton	665	1264	1256	1308	1831	1731	1972	604	457	-
Export	Ton	-	-	-	554	821	1461	3861	5634	5860	21912
Consumption	Ton	473081	506779	738878	676279	885321	947112	987936	1262751	1068619	1138899

Table No. 5

Total Production of Winter & Summer Crop Vegetables with their relative importance from 1958 - 1959 to 1970 - 1971

	Summer crop vegetables 1000 Tons	Winter crop vegetables 1000 Tons	Total Production 1000 Tons	Ratio of Total Production	
				Summer crop	Winter crop
1958 - 1059	449	109	558	80.4%	19.6%
1964 - 1965	1133	251	1384	81.9%	18.1%
1965 - 1966	1229	267	1496	82.2%	17.8%
1966 - 1967	1509	297	1806	83.6%	16.4%
1967 1968	1303	304	1607	81.1%	18.8%
1968 - 1969	1381	302	1683	82.2%	17.8%
1969 - 1970	1447	281	1728	83.7%	16.3%
1970 - 1971	1974	340	2314	58.3%	14.7%

Source: Same as for table 3

Note: Figures in this table differ slightly from those of table 2 & 4 due to diffenent sources.

Table No. 6

Local Production and Consumption of Fresh Tomato

	Unit	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Area Planted	Donum	110636	110452	114639	128653	126173	116730	146665	149082	173482	172472
Production	Ton	189048	195818	216402	241371	232157	220163	310680	382859	368160	355205
Import	Ton	42473	30026	62523	40763	49697	39822	30846	7279	2101	200
Export	Ton	-	-	-	-	99	310	753	145	833	477
Local Consumption	Ton	231521	225844	278925	282134	281755	259675	340773	389993	369428	354928
Quantity used for Tomato Paste.	Ton	-	-	-	6	28	607	1518	2812	21203	16000

Table No. 7
Consumption of tomato paste and Fresh Tomato

	1963	1964	1965	1966	1967	1968	1969
1. Imported Tomato Paste in Tons	5806	7747	10952	12566	12547	10874	10932
2. Its equivalent of Fresh Tomato (x 6)	51036	46482	65712	75395	75282	65244	65592
3. Total Consumption as Fresh Tomato	229910	278000	291556	354321	357416	347000	325267
4. Ratio of Local Production to total consumption	62.2%	68%	68%	61%	67.5%	67%	76.6%
5. Ratio of Tomato paste of fresh tomato as total consumption	22%	17%	22.5%	21%	21%	19%	20%

Table No. 8

Production & Consumption of Date

	Unit	1960	1961	1962	1963	1964	1965	1966	1967	1968
Production	Ton	270000	300000	320000	420000	310000	310000	280000	380000	330000
Exports	Ton	176001	217220	238927	202076	228757	235227	216713	268469	222623
Consumption	Ton	93999	82780	81073	167923	91643	74773	73287	111531	107377
Quantity used in making date syrup	Ton	1643	2018	2129	2452	3538	2234	2220	2916	5379
Ratio of Qt. used in date syrup to total consumption	%	1.3%	2.4%	2.6%	1.4%	3.8%	3.0%	3.5%	2.6%	5%

Table No. 9

No. of Fruit Trees and its Production according to 1971 GAgricultural Count

Type of Fruit	No. of production Trees	Production of every tree in Number	
		Min	Max
Orange	2,276,928	13	129
Sweet Lemon	149,178	4	53
Lemon	139,165	5	43
Pomegranate	2,243,322	6	45
Apple	1,013,020	6	33
Pear	78,273	1	28
Peach	99,021	1	23
Plum	130,620	2	37
Apricot	468,110	4	25
Grapes	10,952,816	3	25
Fig	314,200	4	30
Olives	47,775	2	28

Table No. 10

Exports & Imports of Fruits

Type of Fruit	Imports				Exports			
	1970	1971	1972	1973	1971	1972	1972	1973
Citrus Fruits	1000	683	404	115	3	2	2	1
Banana	3360	5229	4645	4034	-	-	-	-
Apple	12106	18345	23429	9407	300	204	95	203
Grapes	-	-	-	-	91	221	76	222
Pomegranate	-	-	-	-	107	91	74	59
Other Fruits	1412	1622	-	183	142	128	69	90

Table No. 11

Sales value of canned products produced by State Canning Co.
during the period 1967-1968 to 1973-1974 in Thousand Iraqi Dinars

Product	1967-1968 base year	1968-1969		1969-1970		1970-1971		1971-1972		1972-1973		1973-1974	
		I.D.	% *	I.D.	% *	I.D.	% *	I.D.	% *	I.D.	%	I.D.	% increase
Jams	99	138	39%	183	84%	164	65%	172	73%	179	80%	263	165%
Canned Vegetables	21	30	43%	67	219%	87	314%	95	352%	91	333%	142	576%
Tomato Paste	-	1	-	26	-	498	-	1393	base year	2642	89%	4789	243%
Date Syrup	41	61	49%	71	73%	42	2%	64	56%	91	121%	186	353%
Total	161	230	42%	347	115%	791	391%	1724	970%	3002	1763%	5380	3241%

* This ratio represent the percentage increase in sales value coupared to base year.

* Comparison is based on fixed prices

Table 11 continued
Quantities of Canned Products Produced BY State Canning Co.
during 1967 - 1968 to 1973 - 1974 in Tons

Product	1967-1968 base year	1968 - 1969		1969 - 1970		1970 -1971		1971-1972		1972-1973		1973-1974	
		Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%
1. Jams	614	616	-	509	(18)%	714	16%	839	36%	471	(24)%	9280	51%
2. Canned Veg.	74	16	(79)%	347	368%	337	355%	442	497%	536	624%	828	883%
3. Tomato Paste	1	4	-	162	-	1795	Base Year	4881	171%	11677	550%	11514	541%
4. Date Syrup	73	1025	Base Year	971	(6)%	673	(35)%	976	(55)%	1515	47%	3407	232%

Table (11 a)
Fixed Capital Development of State Canning Co.
in 1000 Iraqi Dinars

Base Year 1967 - 1968 ID.	1968 - 1969		1969 - 1970		1970 - 1971		1971 - 1972		1972 - 1973		1973 - 1974	
	ID.	% increase	ID.	% increase	ID.	% increase	ID.	% increase	ID.	% increase	ID	% increase
322	339	5%	383	19%	555	72%	658	104%	2294	612%	3112	866%

Table No. 12
Quantities of Products Sold
By State Canning Co. during
1972-1973 and 1973 1974

Product	Quantity Sold in Tons		% increase
	1972-1973	1973-1974	
Jams	681	985	45%
Canned Vegetables	487	752	54%
Date Syrup	1362	2969	118%
Tomato Paste	10926	17781	63%

Table 13

Planned Production of the State Canning Company for 1974-1975 in Tons

Product	Quantity
1. Jams	1000
2. Canned vegetables	1000
3. Tomato Paste	10 000
4. Date syrup	4200

Table No. 14

Production and Local Consumption of Canned Products

	Unit	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Date Syrup											
Production	Ton	1019	1251	1320	1607	2190	1642	1819	1661	3161	N.A.
Export	Ton	2146	963	729	1589	1183	1141	1548	1831	2080	2091
Consumption	Ton	-	288	591	18	-	501	271	-	1099	-
Tomato Paste											
Production	Ton	-	122	60	229	189	8	64	2	4	44
Imports	Ton	4478	4099	7375	8506	7747	10952	12566	12547	10874	10932
Consumption	Ton	4478	4221	7435	8735	7936	10960	12630	12549	10878	11076
Canned Veg. & Fruits											
Production	Ton	-	34	45	55	156	256	21	75	153	347
Imports	Ton	1368	1131	1230	798	856	659	792	462	616	N.A.
Exports	Ton	-	-	-	-	-	-	-	-	82	N.A.
consumption	Ton	1368	1165	1275	853	1012	924	813	537	687	-
Jams											
Production	Ton	N.A.	N.A.	N.A.	88	341	228	216	676	687	509
Imports	Ton	=	=	=	850	729	438	108	6	45	87
Exports	Ton	=	=	=	-	-	-	-	-	-	-
Consumption	Ton	=	=	=	938	1070	666	324	682	699	596

N.A. = Not available

Table 15

Consumption Forecast for Tomato Paste

In Iraq

Year	Expected Consumption in tons
1975	19 700
1976	20 700
1977	21 700
1978	22 700
1979	23 600
1980	24 600
1981	25 600
1982	26 600
1983	27 600
1984	28 500
1985	29 500

Table 16

Consumption Pattern & per consumption

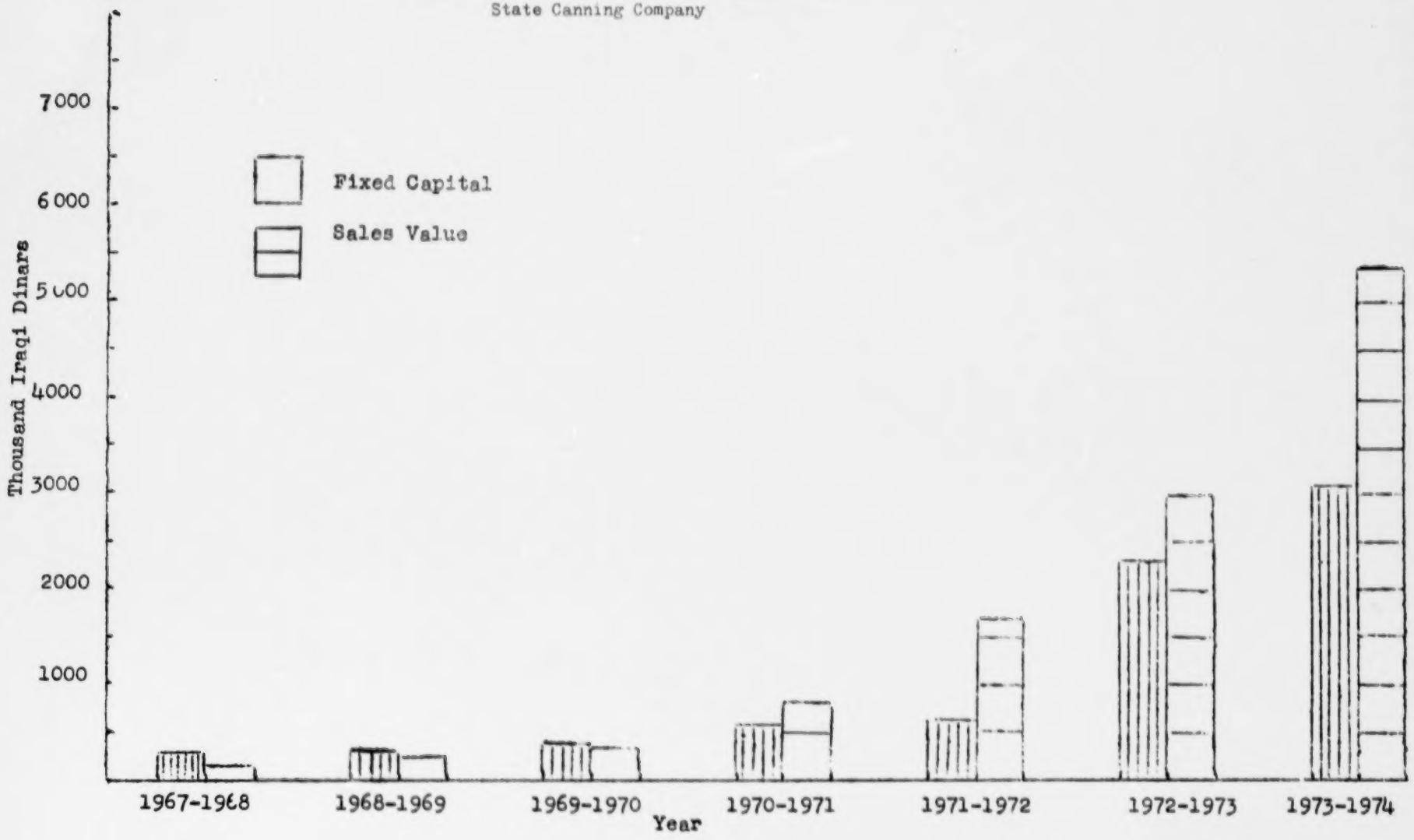
of tomato paste

Year	Concumption Tons	Relative increase	Per Capita consumption kgm.	Relative increase
1960	4478	100.0	0.546	100.0
1961	4221	94.3	0.590	91.3
1962	7435	166.0	1.009	156.2
1963	8735	195.1	1.149	177.9
1964	8936	177.2	1.011	156.5
1965	10960	244.8	1.353	209.4
1966	12630	282.0	1.510	233.7
1967	12549	280.2	1.457	224.9
1968	10878	242.9	1.220	188.9
1969	11087	247.3	1.203	186.2

Chart No. 1

Development of Fixed Capital and Sales Value

State Canning Company



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STUDY ON FOOD PROCESSING IN THE KINGDOM OF SAUDI ARABIA[1/]

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STUDY ON FOOD PROCESSING IN THE KINGDOM OF SAUDI ARABIA 1/

prepared by

Industrial Studies and Development Centre
Riyadh

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Summary

This study was prepared on the basis of letters of reference numbers 102/8/1510 and 102/8/1512 dated 13/4/1394 H (6/5/1974 A.D.) forwarded to the Technical Co-operation Administration of the Ministry of Trade and Industry, and the Industrial Studies and Development Centre, based (wherever possible) on the outline set out in the ESCWA circular attached to the above mentioned letters.

This study was prepared for presentation at the meeting to be held in Beirut for the determination of regional and national priorities in the development of feed processing in the Middle East.

The sectors of food processing to be talked about are: sugar, vegetable oils and fats, animal feed, fruits and vegetables and baby food. Hense, the study deals with industrial projects, whether existing or under-way, or such projects for which initial studies have been made only in the above mentioned sectors.

The data for this study has been derived either from the factual findings of the visits made to food factories in the Kingdom of Saudia Arabia, from the factual findings of the studies made by the Industrial Studies and Development Centre or from the files of such factories kept at the General Administration of Industry - Ministry of Industry and Trade.

Sugar Processing Industry

A factory for refining raw sugar will be established in Jedda, with a production capacity of 100,000 tons of refined sugar, per year.

The capital required for such project has been estimated at 54,490,000 riyals approximately, 25 percent of which is the share of the English Company, Tate and Lyle.

Initially, raw sugar will be imported to the Kingdom from abroad. Refining will be carried out in the proposed factory. In the long run, however, raw sugar will be produced locally. The sugar cane plantation will be developed in Jizan, in the south of the Kingdom. Once this project is implemented, the entrepreneurs will undertake another one for the extraction of raw sucrose from sugar cane in the same area.

The following tables show the quantities of imported refined sugar to the Kingdom during the period 1961-1972 and the expected quantities of raw sugar to be refined during the coming five years.

Table 1

Imported Refined Sugar:

Year	Value in Thousands of Riyals	Quantity in Tons
1961	24.955	71.767
1962	6.942	15.920
1963	21.606	18.732
1964	45.778	76.400
1965	20.782	56.030
1966	37.874	120.393
1967	8.474	25.362
1968	27.091	72.258
1969	23.470	68.742
1970	32.159	69.120
1971	48.147	80.467
1972	70.267	105.568

Source: Foreign Trade Statistics

Table 2

Sugar to be Refined Locally

Year	Quantity in Tons
1974	96.700
1975	103.500
1976	110.000
1977	117.500
1978	125.000

It is evident from the above projection that the plant proposed to be established in the Kingdom, for sugar refining, will be adequate for covering

for the time being, local consumption of sugar. Expansion of sugar cane plantations in large quantities, and the possibility of successful growing of sugar beet in the eastern area, will open the way for other ventures in sugar projects, either for the extraction and refining of raw materials in order to meet the increase in the demand and export the excess of sugar produced, or the exportation only of raw materials, after being extracted from sugar cane or sugar beet.

Vegetable Oils and Fats Industry

The Industrial Studies and Development Centre - Riyadh, is preparing a study on the economics of processing vegetable oils and fat at a production capacity of 5,000 tons/year of oil, 20,000 tons/year of fat.

The following table shows the quantities of imported vegetable oils and fat during the period 1965-1972:

Table 3

Imports of Vegetable Oils and Fats

Year	Vegetable Oils (in tons)	Fats (in tons)
1965	3374	17181
1966	3665	14413
1967	6005	19668
1968	4257	19572
1969	5923	14374
1970	4437	18037
1971	9602	22713
1972	7136	23066

Source: Foreign Trade Statistics

Projecting the actual demand, the following table was estimated:

Table 4

Estimates of the Demand of Vegetable Oils and Fats

Year	Vegetable Oils (in tons)	Fats (in tons)
1973	7993	23738
1974	8521	24951
1975	9049	26164
1976	9577	27277
1977	10105	28590
1978	10633	29803
1979	11161	31016
1980	11689	32229
1981	12217	33442
1982	12745	34655

In view of the success of the growing of sunflower in the south of the Kingdom and the possibility of expanding its production, and due to the fact that its seeds can yield, by extraction, vegetable fats and oils, we find it encouraging to propose (although economic studies are not yet integrated) giving top priority to ventures in vegetable oils and fats projects.

Animal Feed Processing Industry

1. Demand for Animal Feed

A. Poultry Feed

The demand for this kind of feed comes from places and centres of poultry husbandry and breeding for meat and eggs purposes. The Kingdom has witnessed during the last few years an expansion in the husbandry and breeding of poultry and production of egg , which led to an increasing demand for feed, including concentrated processed feed.

The following table shows the quantity of feed required for consumption in the years 1390 H and 1396 H (1970 and 1976):

Table 5

Demand of Animal Feed

Description	Yr. 1390 H (1970)	Yr. 1396 H (1976)
Number of laying hens	840.000	910.000
Quantity of feed needed yearly for consumption/ton	21.000	41.000
Number of chickens	4,350.000	7,350.000
Quantity of feed needed yearly for consumption/ton	13.000	30.000
Total of annual feed consumption in tons	34.000	71.500

Source: Estimates by Arthur De Lytle

B. Livestock

(a) Estimated Demand

This kind of feed is usually consumed by cows, calves and sheep, for two fundamental objectives, namely, fattening and milk. The use of concentrated feeds, however, is currently restricted to governmental fields and farms and private rural stations for raising cattle. As for the rest of the domestic animals in the Kingdom, they depend on clover (berseem), grasses and a blend of cereals such as maize and barley.

According to estimates made by the World Food and Agriculture Organization, FAO, of the number of domestic animals in the Kingdom of Saudi Arabia, it has been found that in 1969, the number of cows and calves was 180,000 head, and that of sheep was about 3,000.000 head. Assuming that the rate of growth is 10% (according to the average rate of growth in the previous years), the number of cows and calves in 1976 will be 306.000 head and that of sheep 3,710.000 head.

Supposing that 15% (=45900) of the cattle and 5% (=160500) of the sheep feed on concentrated feed, the estimated demand for animal feed in 1976 will be approximately 53.5 thousand tons.

Table 6

Existing Factories' Data

Name of Factory	Start of Operations	Location	Capital		Production Capacity		Type of Production	
			1973	1975	1973	1975	Kind	Purpose
Saudi Arabian Feed Co.	1968	Dammam	270.000	2,500.000	9.500	60.000	Livestock and Poultry Feed	Local Marketing
Feed Co. Jedda (Faqih)	1970	Jedda	1,500.000	-	12.000	-	Poultry Feed	Private Farm
Poultry Arab Co.	1972	Taif	400.000	-	3.500	-	Poultry Feed	Private Farm
Al-Riyadh Poultry Co.	1974	Riyadh	-	785.000	-	7.200	Poultry Feed	Local Marketing
Saudi Co. for Agricultural Development	1975	Riyadh	-	5,000.000	-	12.000 feed 6 million chickens	Poultry Feed chicken meat	Private Farm

2. Local Production

A. Existing Factories:

In the Kingdom, there are several factories which produce poultry feed but until now none of them produced livestock feed. Some of the existing factories are thinking of expanding their production capacity as to include processing of livestock feed.

Saudi Arabian Feed Co. expects to utilize its maximum production capacity within three years as from the starting date of production. During the first year of expansion (1975), production will reach 25.600 tons of feed, of which 19.600 tons will be poultry feed and 6.000 tons will be animal feed, produced in the Kingdom for the first time. Assuming that production capacity in Dammam will reach in 1976, 42.500 tons of feed divided into 29.750 tons of poultry feed and 12.750 tons of animal feed in addition to the capacities of other factories. The total capacity of the factories, in 1976 A.D./1396 H, will be:

1. 64.450 tons of poultry feed
2. 12.750 tons of animal feed

This shows that the local production in 1976 will cover 90% of the Kingdom's need of poultry feed and only 20% of the Kingdom's need of concentrated livestock feed.

B. Production Cost Incurred by Saudi Arabian Feed Company/Damman

Details of production costs incurred by Saudi Arabian Feed Company/ Dammam for the production of 3600 tons of poultry feed in 1388 H (1968) are as follows:

(a) Fixed Costs

Depreciation of buildings and installations	3%	4500
Depreciation of equipment and machines	10%	4930
Depreciation of vehicles and transportation	20%	8000
Depreciation of funiture	20%	2000
Outlay of institution	20%	4000
Maintenance	2.5%	2233
Others		16800
Non Saudi Arabian		75600
		118,063

(b) Variable Costs

Raw Material	2198681
Wages of Workers	24000
Electric Power	9000
Water Supply	1800
Other Variable Costs	20033
Fuel	7200
	2,260,714

Total of fixed and variable costs

118063 + 2260714 = 2378777 Riyal

Average cost / ton = 2378777 + 3600 = 660 Riyal / ton

Production cost / ton jumped from Riyals 660 to Riyals 853 / ton, although production capacity increased from 3600 tons in the year 1388 H to 5600 tons in the year 1391 H and 9000 tons in the year 1393 H, due to a rise in the prices of imported raw materials and their transport costs.

3. Raw Materials

Raw materials used in feed factories are imported from the United States, but certain materials used in concentrated feeds are imported from Lebanon.

It is expected that the rate of raw materials to be imported in the future will decrease once some food industries have been established, such as flour mills, silo extraction of molasses, conservation of dates, processing of sugar, vegetable fats and oils, and agricultural expansion in the production of variety of cereals, namely various species of corn, wheat and barley has been realized.

A. Kinds of Raw Materials:

(a) Vegetable Products: We mention here barley, wheat and maize which can be provided locally side by side with the agricultural expansion of cereal crops.

(b) By-products of certain industries: like soya cakes which can be locally supplied when and if the vegetable oil industry is established in the country.

(c) Industrial products: These are represented in concentration elements, chemical compounds and anti-organics. The need for the importation of such kinds of materials will continue for a long time.

B. Average Price of Raw Materials:

(a) Corn (various species), wheat and barley - price per ton: 420 riyals.

(b) Soya and concentrated feeds - price per ton 1300 riyals.

4. Problems Encountered by Feed Factories in the Kingdom

The rise of the prices of imported raw materials and the lack of media of transportation for carrying such materials from the countries of origin to the Kingdom are the basic problems. However, the technical and economic agreements being concluded between the Kingdom and certain industrial countries, at present, are likely to put an end to such problems.

5. Recommendations

Expansion in the various fields of development, which the Kingdom is experiencing today, particularly in the field of animal husbandry tend to give great importance to investment in feed processing and it is considered among the sucessful projects which, along with the regulation of economic diversification, would help in reaching high levels of animal husbandry development. Investment in new projects of poultry feed, however, may appear of no use due to the fact that the existing production capacity can meet all demands in the near future by operating on the basis of two shifts and it is preferable to focus at present, on investment in animal food projects.

Tomato Sauce and Juice Processing

1. Introduction:

A factory for processing tomato sauce and juice was established on a site in the Industrial Zone, Riyadh, in the early months of the year 1394 H, 1974 A.D.

The capital of this factory is riyal 8.6 million.

The production capacity of this project amounts to 1560 tons of tomato sauce and 1800 tons of tomato juice per annum.

The factory will establish a production plant for making and processing tinplate cans, capital being riyals 2.2 million and the production capacity of 48 million cans per year.

In addition to the Al-Riyadh factory there will be established in the area of Al-Qaseem another factory with a capital of 3.3 million riyals and with a production capacity of 3600 tons per annum (3000 tons of sauce and 600 tons of juice).

2. Raw Material

The raw material used in tomato sauce and juice is fully red high quality fresh tomato. The only ingredient added in the processing of tomato juice is pure table salt at a ratio of 3.5%.

As it is estimated, the existing plant requires about 18.000 tons of fresh tomato annually.

The factory owns a plantation which covers 30% of the required quantitity of tomatos. The remaining part is purchased from the local market. In 1970/71 the quantity of tomatos produced in the Kingdom was estimated to be 70.000 tons.

Fresh tomato prices fluctuate in accordance with supply and demand, like prices of other commodities, under the influence of the policy of free economy followed in the Kingdom. The economic factors of the existing project, however, do not allow the purchase price of one ton of fresh tomatoes to exceed 450 Riyals.

The quantity of tomatos locally purchased created certain problems for the project due partly to lack of uniformity of the entire quantity purchased with good quality specifications, and partly to occasional rise and fluctuation of prices. In studying the various ways of supplying the existing factory with raw material, it had been found that it would be best for the factory to own a farm where the needed quantity and quality can be met. The State may grant the factory the necessary land for such purposes.

3. Production Capacity

A. Brief Description of Production Operations

Tomato juice and sauce pass through several processing stages before they reach the final form available in the market.

(a) First Stage: This includes delivery of tomatoes, washing of the heads to remove sticking dirt and sorting them out in order to use the good heads and throw away the bad ones.

(b) Second Stage: At this stage, operations include mashing, straining, exposing to evaporation and concentration. Cans and lids are also sterilized.

(c) Third Stage: This stage has to do with canning and soldering.

It should be noted that tomato juice passes through the same stages as

tomato sauce except those operations of evaporation and concentration. The equipment used in the above mentioned stages is made of stainless steel and all the steps of processing are carried out automatically.

4. Labour

The existing project requires forty-eight workmen including thirty-nine non-technicians, six technicians and three mechanics. The factory was established to operate 150 days yearly. It needs an administrative staff of fourteen persons.

5. Final Product

A. Conformity with Specifications:

The scientific specifications observed in the Kingdom are applicable to the final product. When the entire dry substance found in the sauce ranges between 28% and 30%, it means that this conforms with good specifications (other kinds of various good qualities are available in the markets of the Kingdom with 22% of dry substance to begin with). The dry substance dissolved in the tomato juice constitutes 5.8% in addition to a proportion of pure salt which reaches 3.5%.

B. Quantity:

The sauce product of the factory, of an output of 1560 tons, is filled in containers of net weight of 70, 150 and 500 grams. The tomato juice product, of an output of 1800 tons, is filled in containers of net weight of 170 grams.

The following tables show the quantities of tomato juice and sauce imported into the Kingdom during the years 1969 to 1971 and the demand for 1974 to 1978.

Table 7

Imported Quantities of Tomato Juice and Sauce

	1389/1969	1390/1970	1391/1971	1392/1972
	Qt/ton	Qt./ton	Qt./ton	Qt./ton
Sauce	11782	8971	12523	10232
Tomato Juice	1358	2059	3109	

Source: Foreign Trade Statistics

Table 8

Demand for Tomato Sauce and Juice

Year	Sauce (in tons)	Juice (in tons)
1394/74	13884	1831
1395/75	14296	1900
1396/76	14758	1969
1397/77	15200	2038
1398/78	15652	2107

Costs of Production:

In view of the fact that the existing plant in the Kingdom has not been established long enough to determine the accurate costs of production, it will depend here on the structure of the costs estimated in the economic study of the project, along with the adjustment of the cost of the raw material in accordance with the prices prevailing at the time of the preparation of this study.

(a) Fixed Expenses

First: Wear and Tear

- Depreciation of buildings and installations by 5% of the cost	9000
- Depreciation of equipment and machines by 10% of the cost	140000
- Depreciation of vehicles and means of transport by 20 percent of the cost	4800
- Depreciation of funiture by 10% of the cost	800
- Depreciation of institution outlay by 20% of the cost	10000
Second:	
- Salaries of employees, administrators and engineers	24000
Third:	
- Other fixed costs	50000
Total of fixed costs	238600

(b) Variable Costs

- Direct raw material	6900000
- Wages of Workers (labour)	59000
- Electric power	7000
- Fuel	6000
- Water supply	5000
Total of variable costs	6977000
Total of expenses	7215600

Since the production capacity of the factory is divided between processing of sauce and that of juice, and due to the fact raw materials constitute the greater part of the costs in the ratio of 4:1, the following steps will be adopted in calculating the costs of the production of tomato juice and sauce.

Total of fixed and variable costs	7,215.600
Cost of direct raw materials	6,900.000
Fixed and variable costs including costs of raw Materials	315.000

Average cost per processed ton of sauce and juice excluding costs of raw materials:
315.000 ÷ 3360 = Riyals 94/ton

Cost of raw material used for sauce:
6,900.000 x 4/5 = 5,520.000 Riyals

Cost of raw material used for juice:
6,900.000 x 1/5 = 1,380.000 Riyals

Average share of each processed ton of sauce, of the cost of raw material:
5,520.000 ÷ 1560 = 3538 Riyals

Average share of each processed ton of juice, of the cost of raw material:
1,380.000 ÷ 1800 = 766 Riyals

Average cost of processed sauce:
3538 + 94 = 3632 Riyal/ton

Average cost of processed juice:
766 + 94 = 860 Riyals/ton

6. Comparison of Local Product with Imported Product

Imported product does not constitute any tangible competition with local product. The cost of local product - average cost being Riyals 3632/ton of sauce and Riyals 860/ton of juice - offers it a firm stand in the field of competition. While the price of one ton of imported sauce reaches approximately Riyals 4200 and that of juice Riyals 2320, we find that the average sale price of locally produced sauce reaches Riyals 4060/ton, and that of locally produced juice reaches Riyals 2280/ton, not to mention the quality of imported sauce

available in the market which does not always match that of locally produced sauce. There is more demand, however, for imported product since it is older in the markets and better known. Still this can be overcome by means of publicity and advertising and by adopting appropriate marketing methods.

7. Recommendations

- Processing of tomato juice and sauce is considered to be an important step towards economic expansion in the Kingdom. In view of the fact that most of the raw materials are available locally, investment in these projects deserves a high degree of priority.

- By comparing the present production capacity of tomato sauce and juice and that to be attained in the near future (6960 tons yearly) with the demand expected within the coming five years (18200 tons approx.), it seems necessary to increase the production capacity either by means of expanding the existing projects or by establishing new plants.

As a general policy of the State, having as its aim the expansion of the industrial base in the Kingdom and reclamation of land, it may seem appropriate to establish more than one plant in the Kingdom, to be distributed among such areas where tomatoes are grown since:

- Growing of tomato will extend to many areas in the Kingdom.
- The factory owners will be usefully assured of obtaining new material from areas not far from the plant and the farmers as well will be assured that their products will be sold.
- A great opportunity will be open to free competition for the maintenance of good quality, reduction of costs and deprivation of plants enjoying a monopoly.

Baby Food Processing

The Centre has carried out certain studies to estimate the demand for baby food made from cereals, in order to evaluate the idea of establishing a baby food industry in the Kingdom.

The following table shows the expected demand for fruit and vegetable baby food:

Table 9

Baby Food's Demand

Year	Demand Expected (in ton)
1392	324
1393	256
1394	392
1395	431
1396	474
1397	521
1398	573
1399	620
1400	672

It has become clear from field survey, that most of the imported baby food is the product of the two American Companies: Heinz, which covers 90% of the demand and Gerber which covers 10%. The study has recommended that a Baby Food industry is not to be established in the Kingdom, for the following reasons:

1. Such industry requires long experience in this field.
2. Due to its delicacy, this industry requires laboratories and strict hygienic supervision.
3. Falling short of competing with world leading companies which produce millions of tons yearly.
4. The demand is still small and not encouraging enough to urge an international company to participate in projects such as these.